

IN THE CLAIMS

Please cancel Claims 2, 6 and 19 without prejudice, amend Claims 1, 7, 11, 15 and 20, and add new Claims 21-30 as follows:

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1. (Currently amended) Optical data communications apparatus, comprising:  
a first coherent light source adapted to produce first electromagnetic radiation; and  
an atomic medium adapted to substantially alter the speed of propagation of said first  
electromagnetic radiation therethrough;
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- wherein said first electromagnetic radiation is used to transfer ~~information~~ a plurality of  
data bits from one location to at least one second location; and  
wherein said atomic medium stores quantum state information that can be subsequently  
read out therefrom.
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2. (Cancelled)
3. (Original) The apparatus of Claim 1, wherein said medium comprises at least in part  
Rubidium (Rb) atoms.
4. (Original) The apparatus of Claim 1, further comprising a second coherent light  
source, said second light source adapted to produce second electromagnetic radiation, said  
second electromagnetic radiation cooperating with said atomic medium to provide said altering  
20 of said speed of propagation.
5. (Original) The apparatus of Claim 4, wherein said apparatus comprises a delay  
device adapted to selectively delay the propagation of said first electromagnetic radiation to said  
at least one second location.
6. (Cancelled)
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7. (Currently amended) A method of conditioning light energy in an optical data  
communication system, comprising:  
providing first electromagnetic radiation having ~~a plurality of~~ information associated  
therewith;  
providing second electromagnetic radiation;
- 30
- providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation to store at least part of said information therein; and

selectively and subsequently irradiating said medium with said second radiation, said second radiation at least in part controlling the ~~propagation of said first radiation through~~ readout of said stored information from said medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on receiving input from said data communication system.

8. (Original) The method of Claim 7, wherein said act of receiving input comprises receiving information relating to the dispersion of light energy pulses within said system.

9. (Original) The method of Claim 7, further comprising diverting at least a portion of said first radiation for propagation within said communication system apart from said atomic medium.

10. (Original) The method of Claim 9, wherein said act of receiving input comprises receiving information relating to the dispersion of said at least portion of said first radiation.

11. (Currently amended) A method of obtaining information from light energy, comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

providing second electromagnetic radiation;

providing third electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation so as to alter the propagation speed of said first radiation within said medium;

interrogating said medium using said third radiation so as to obtain a readout therefrom; and

obtaining said information from said first radiation based on the interaction of at least said third radiation with said first radiation.

12. (Original) The method of Claim 11, further comprising generating at least one light pulse based on said act of obtaining.

13. (Original) The method of Claim 12, further comprising transmitting said at least one light pulse over an optical communications system.

5 14. (Original) The method of Claim 13, further comprising controlling said acts of selectively irradiating and transmitting said at least one light pulse over said system so as to create a desired temporal relationship between said first radiation and said at least one light pulse.

10 15. (Currently amended) Optical pulse conditioning apparatus, comprising:  
a trapped and cooled medium adapted to receive modulated light energy from a first light source;

a second source of electromagnetic energy adapted to irradiate at least a portion of said medium using electromagnetic energy, said electromagnetic energy altering the propagation of said modulated light energy through said medium; and

15 controller apparatus operatively controlling said irradiation of said medium by said electromagnetic energy so as to control at least one physical parameter of said modulated light energy.

16. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises pulse width.

20 17. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises the chromatic content of said modulated light energy.

18. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises the amplitude of at least one constituent wavelength of energy within said modulated light energy.

25 19. (Cancelled)

20. (Currently amended) The apparatus of Claim ~~15~~ 19, wherein said controller apparatus further comprising comprises an optical modulator ~~operatively coupled to said processor~~, said modulator adapted to modulate said electromagnetic energy ~~based on signals received from said processor~~.

21. (New) The apparatus of Claim 19, further comprising a digital data processor, said processor operatively coupled to said optical modulator, said processor controlling the operation of said modulator at least in part

22. (New) The apparatus of Claim 1, wherein said medium comprises a magnetically trapped medium.

23. (New) The apparatus of Claim 1, wherein said medium comprises a cooled Bose-Einstein condensate.

24. (New) The apparatus of Claim 1, wherein said medium comprises a medium cooled by multi-dimensional Doppler cooling.

25. (New) The apparatus of Claim 1, wherein said alteration of the speed of propagation of said first electromagnetic radiation through said medium comprises completely stopping the propagation of said first radiation for at least a period of time.

26. (New) The method of Claim 11, wherein said alteration of the speed of propagation of said first radiation through said medium comprises completely stopping the propagation of said first radiation for at least a period of time.

27. (New) A method of conditioning light energy in an optical communication system, comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on receiving input from said communication system;

wherein said act of receiving input comprises receiving information relating to the dispersion of light energy pulses within said system.

28. (New) A method of conditioning light energy in an optical communication system, comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

5 providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium;

10 wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on receiving input from said communication system; and

wherein said method further comprises diverting at least a portion of said first radiation for propagation within said communication system apart from said atomic medium.

15 29. (New) The method of Claim 28, wherein said act of receiving input comprises receiving information relating to the dispersion of said at least portion of said first radiation.

30. (New) A method of storing and subsequently reading out data from an atomic medium, comprising:

providing first electromagnetic radiation having a data associated therewith;

20 providing second electromagnetic radiation;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation at two or more subsequent times to said irradiation with said first radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium;

25 wherein said act of selectively irradiating causes the same of said information to retrieved from said medium two or more times.